with previous guidance suggesting limited activity in the first 24 h at altitude, if possible, to decrease the risk of experiencing AMS.

[0251] The relationship between gender and the risk of AMS has been reported in numerous studies on trekkers and mountaineers (2, 10, 29, 38). Most studies have reported that men and women are equally susceptible to AMS (6, 10, 29, 30, 38, 39) or that women have a slightly greater risk of developing AMS (2). We found that women demonstrated 29% lower (P=0.05) AMS severity scores at 20 h regardless of altitude or activity level, which agrees with one previous report (40). The odds of experiencing AMS and odds of falling into a higher ordered category of AMS also tended (P=0.10) to be lower in women compared to men. The severity but not the prevalence of AMS was therefore higher in males. This finding may be due to the fact that all of our women in our database were pre-menopausal and progesterone, a known ventilatory stimulant, is higher in women compared to men (41, 42). An increase in ventilation is an important aspect of altitude acclimatization and has been associated with a reduction in AMS (43, 44). Although a few studies found increased ventilation in acclimatized women compared to men (46) more recent work has not substantiated this finding in unacclimatized women (46). Other physiologic differences between genders (i.e., differences in endothelial permeability, free radical production, or perception of pain) may be contributing to this gender difference in AMS symptom severity but more work is needed to elucidate potential physiologic mechanisms.

[0252] The odds ratio going from 0-20 h of exposure also differed between men and women. In this time frame, active men are clearly at risk as low as 2000 m but active women are not at risk until 3000 m. Most reviews suggest that AMS is rare below 2500 m (20, 34) but some have reported the development of AMS as low as 1800 m to 2100 m (28, 47). Our model supports the later conclusion but only for active males. Thus, another important feature of the present models relates to being able to differentiate for the first time differences and onsets of AMS severity, prevalence, and grade of severity between men and women at relatively low altitudes.

[0253] The fact that age, BMI, race, and smoking status were not significant factors in predicting AMS severity, prevalence, or grade of severity is consistent with many previous reports (2, 9, 30, 39). Although some (6, 10, 38) have reported a decreased prevalence of AMS with increasing age and lower BMI, these conclusions were based on older (age 50 yrs) and obese individuals (BMI 30 kg/m2). Ri-Li et al. (40) reported a greater nocturnal desaturation at altitude in obese individuals which contributed to a greater prevalence of AMS and also found that heavier individuals were more likely to develop AMS at altitude (40). Our data set was limited to relatively fit individuals between 18 and 45 yr with a mean age of ~24 yr. We cannot, therefore, exclude the possibility that age or obesity may have been a factor in our model had we utilized older or obese individuals in our data set. Although conclusions from this model suggest that race is not a significant factor for the development of AMS within the broad classification categories utilized in the model (i.e, white and non-white), this factor requires further study due to the limited number of non-white individuals in our database.

[0254] The results suggest that in addition to altitude and time spent at altitude, high activity increases the risk of developing AMS. The AMS models also suggest that AMS severity is increased in men but the prevalence of AMS is the same in both men and women. Although predictions from these models are limited to a homogeneous population that is relatively young and fit, these AMS models for the first time quantify the increased risk of AMS for a given gain in elevation, the time course of AMS symptoms, the baseline demographics that increase the risk of AMS, and estimates of different grades of AMS severity (i.e., mild, moderate, and severe). These AMS models can be utilized to predict AMS prior to exposure to a wide range of altitudes in any unacclimatized lowlander just by knowing the destination altitude, length of stay at altitude, physical activities planned during the stay at altitude, and general baseline demographics.

[0255] Personal Altitude Acclimatization Monitor (PAAM)

[0256] The Personal Altitude Acclimatization Monitor (PAAM) is a hardware platform that comprises, in various embodiments, either a "wrist-watch", "pedometer", PDA or "Smart Phone" by way of example. See FIG. **32**. The PAAM automatically logs & estimates individual/unit altitude acclimatization status using inputs, including but not limited to: barometric pressure and time and target altitude to produce a reportable output, such as target altitude acclimatization status, for example. The data may be automatically collected or entered manually by way of user data entry. Models appropriate for use in PAAM apparatus or systems include, but are not limited to the three AMS models, one physical performance model and one altitude acclimatization model as described above.

[0257] The PAAM, or alternatively, the Automated Altitude Acclimatization Monitor (AAAM) is a mobile, portable, and durable hardware platform that integrates sensors such as, by way of nonlimiting example, a barometric pressure sensor, with the disclosed predictive models of altitude acclimatization to a range of altitudes (for example, 1,600 meters to 4,500 meters) of this invention. The hardware platform may constitute, by way of nonlimiting example altimeter-recording devices, wristwatches, GPS devices, and smart-phones.

[0258] The user will initialize the AAAM, and select a "target" elevation to acclimatize to. A built-in barometric pressure sensor will measure and record the user's altitude profile preset time intervals (e.g., for example every 10 minutes to every 60 minutes) over the period of acclimatization (for example, a range of 2 days to several weeks). The disclosed altitude acclimatization module disclosed as part of this invention will be used to by an on-board CPU to calculate the user's current acclimatization status in real-time. The AAAM hardware platform will be equipped with means for displaying the data generated by the on-board CPU, to include, for example, the user's current acclimatization status expressed in terms of decreased risk of developing AMS and/or improved physical work performance capabilities at a specified operational altitude.

[0259] The AAAM hardware platform may be equipped with means for the storage and retrieval of data, such as, for example, longitudinal user altitude profile data. The AAAM hardware platform will be equipped with input means allowing the user to change the operational altitude of interest, and to determine the acclimatization status over a range of varying altitudes.

[0260] A software application will automate environment data acquisition and storage and provide real-time altitude acclimatization status outputs in both text and graphical formats.

[0261] While a specific embodiment of the invention will be shown and described in detail to illustrate the application